

# Substrate And Process Engineering For Biocatalytic Synthesis And Facile Purification Of Human Milk Oligosaccharides (HMOs)

Tech ID: 33436 / UC Case 2022-559-0

## CONTACT

Victor Haroldsen

[haroldsen@ucdavis.edu](mailto:haroldsen@ucdavis.edu)

tel: 530-752-7717.



## INVENTORS

- ▶ Bai, Yuanyuan
- ▶ Chen, Xi
- ▶ Yu, Hai

## OTHER INFORMATION

### KEYWORDS

biocatalysis,  
carbohydrate,  
chemoenzymatic  
synthesis, glycosylation,  
human milk  
oligosaccharides (HMOs)

### CATEGORIZED AS

- ▶ **Biotechnology**
- ▶ Health
- ▶ Other

### RELATED CASES

2022-559-0

ABSTRACT

Researchers at the University of California, Davis have developed an innovative method for efficient, high-yield production and easy purification of Human Milk Oligosaccharides (HMOs) using a Multistep One-Pot Multienzyme (MSOPME) process.

FULL DESCRIPTION

Researchers at the University of California Davis have developed a process that couples substrate and process engineering for the synthesis and purification of structurally defined HMOs. It employs a glycosyltransferase acceptor substrate-tagging strategy, where the carboxybenzyl (CBz) tag simplifies the purification process via the C-18 column and can be easily removed post-purification. This MSOPME process enables production of complex targets without intermediate oligosaccharides' isolation, with a single C18-cartridge purification process of the final product.

APPLICATIONS

- ▶ Production of key ingredients in products aimed at improving human health.
- ▶ Creation of prebiotics and bacteriostatic agents.
- ▶ Development of nutrients for brain development.
- ▶ Production of potential nutraceuticals and therapeutics.
- ▶ Supplement for infant formulas.

FEATURES/BENEFITS

- ▶ Efficient synthesis of complex HMOs without the need for intermediate oligosaccharides purification.
- ▶ Facilitated HMO product purification using a single C18 cartridge/column through the use of a CBz tag.
- ▶ Easy removal of CBz tag to form desired HMOs with a free reducing end.
- ▶ Ability to synthesize structurally defined HMOs in preparative and gram scales.
- ▶ Environmentally friendly enzymatic production method.
- ▶ Potential to be readily adapted for automation.
- ▶ Solves limited access to structurally defined HMOs in sufficient quantities.
- ▶ Addresses need for intermediate steps in the synthesis and purification of HMOs.
- ▶ Overcomes challenges associated with large-scale production of HMOs.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	<a href="#">20250163091</a>	05/22/2025	2022-559

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- ▶ [Purification of Glycosphingosines and Glycosphingolipids](#)
- ▶ [A Photobacterium Sp. Alpha2-6-Sialyltransferase 9Psp2.6St\) A366g Mutant With Increased Expression Level And Improved Activity In Sialylating Tn Antigen](#)
- ▶ [Synthesis of Capsular Polysaccharides](#)
- ▶ [Legionaminic Acid Glycosyltransferases for Chemoenzymatic Synthesis of Glycans and Glycoconjugates](#)

- ▶ Using Escherichia coli to Produce Human Milk Oligosaccharide Lactodifucotetraose
- ▶ 4-N-Derivatized Sialic Acids and Related Sialosides
- ▶ O-Acetyl Glycosphingosines and Gangliosides, as well as Their N-Acetyl Analogs
- ▶ Stable N-acetylated analogs of Sialic Acids and Sialosides
- ▶ Alpha1–2-Fucosyltransferase for Enzymatic Synthesis of Alpha1–2-linked Fucosylated Glycans
- ▶ Engineering Pasteurella Multocida Heparosan Synthase 2 (Pmhs2) For Efficient Synthesis Of Heparosan Heparin And Heparan Sulfate Oligosaccharides
- ▶ One-Pot Multienzyme Synthesis of Sialidase Reagents, Probes and Inhibitors
- ▶ Novel Methods For Chemical Synthesis Of Lactosyl Sphingosines, Glucosylsphingosines, Galactosylsphingosines, And 3-O-Sulfogalactosylsphingosines

**University of California, Davis**  
**Technology Transfer Office**  
1 Shields Avenue, Mrak Hall 4th Floor,  
Davis,CA 95616

Tel: 530.754.8649  
techtransfer@ucdavis.edu  
<https://research.ucdavis.edu/technology-transfer/>  
Fax: 530.754.7620

© 2024 - 2025, The Regents of the University of California  
[Terms of use](#)  
[Privacy Notice](#)